

**ELECTRON BEAM EXCITED SUPERCONDUCTING
ANALOG-TO-DIGITAL CONVERTER**

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ABSTRACT OF THE INVENTION

A system and method for converting an analog voltage signal to a digital representation at high speeds, known as an analog to digital converter (A/D converter), is provided. The invention teaches an N-bit A/D converter, made by N superconducting, preferably HTC, transmission lines. The N lines are arranged adjacently and in parallel with each other. On each line 2^{N-1} JJs are imbedded in series. The JJs form a matrix over the configuration of the N superconducting transmission lines in such a manner that across the lines the JJs give N digit binary numbers, while in the length direction these N digit binary numbers fall in numerical order. A scanning electron beam is made to impinge on this arrangement. The beam is scanned across the lines at a high frequency, while it is deflected by the applied voltage signal along the direction of the lines. The beam generates a voltage step on any one of the N lines on condition of hitting any one of the JJs. In this manner upon each cross-scanning of the beam, an N-bit step voltage pattern is generated on the lines. This pattern is the direct digital readout of the input voltage signal.